

Claims

## WHAT IS CLAIMED IS:

- 5       1. An electrical connector comprising a first member comprising a metallic contact means and a dielectric base means wherein the metallic contact means projects generally perpendicularly from the dielectric base means and a second member comprising a second metallic contact means and a second dielectric base means wherein the second metallic contact means projects generally perpendicularly from the second dielectric base means to be in electrical contact with the metallic contact means of the first member.
- 10      2. The electrical connector of claim 1 wherein dielectric base means of the first member and the second member each have a grounding means.
- 15      3. The electrical connector of claim 2 wherein the metallic contact means of the first member abuts the metallic contact means of the second member.
- 20      4. The electrical connector of claim 3 wherein a plurality of metallic contact means project from the dielectric base means of the first member in spaced parallel relation and a plurality of metallic contact means project from the dielectric base means of the second member and each of said plurality of metallic means projecting from the first member is in electrical contact which one of said metallic contact means of said second member.
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5. The electrical connector of claim 4 wherein each of said plurality of metallic contact means projecting from the first member abuts one of said plurality of metallic contact means projecting from the second member.
- 5 6. The electrical connector of claim 5 wherein the first member is a plug terminator means and the second member is a receptacle means.
7. The electrical connector of claim 6 wherein the plug includes a housing member which surrounds the metallic contact member and dielectric member.
- 10 8. The electrical connector of claim 7 wherein the dielectric base member has a forward extension.
9. The electrical connector of claim 8 wherein the forward extension of the dielectric base member has a plurality of spaced parallel grooves and each of the plurality of metallic contact means is positioned in one of said plurality of spaced parallel grooves.
- 15 10. The electrical connector of claim 9 wherein the plug housing has a rear open end to expose the dielectric base means.
- 20 11. The electrical connector of claim 10 wherein the metallic contact means extend rearwardly through the dielectric base means to terminal rearward contacts.
- 25 12. The electrical connector of claim 11 wherein the plug is provided with a grounding means.

13. The electrical connector of claim 12 wherein the plug housing has an outer side and the grounding means is a spring which extends along the outer side of the housing and extends rearwardly therefrom.

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14. The electrical connector of claim 6 wherein the receptacle includes a housing member which surrounds the metallic contact member and dielectric member.

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15. The electrical connector of claim 14 wherein the dielectric base member has a forward extension.

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16. The electrical connector of claim 15 wherein the forward extension of the dielectric base member has a plurality of spaced parallel grooves and each of the plurality of metallic contact means is positioned in one of said plurality of spaced parallel grooves.

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17. The electrical connector of claim 16 wherein the receptacle housing has a rear open end to expose the dielectric base means.

18. The electrical connector of claim 17 wherein the metallic contact means extend rearwardly through the dielectric base means to terminal rearward contacts.

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19. The electrical connector of claim 18 wherein the receptacle is provided with a grounding means.

20. The electrical connector of claim 17 wherein the plug housing has an outer side and the grounding means is a spring which extends along the outer side of the housing and extends rearwardly therefrom.
- 5 21. The electrical connector of claim 3 wherein the metallic contact means of the first and second members both have ends and said contact means abut end to end.
22. The electrical connector of claim 3 wherein the metallic contact means of 10 the first and second members both have opposed sides and said contact means abut side to side.
23. A method of reducing cross talk and controlling impedance in an electrical connector comprising the steps of providing a first and a second dielectric base means, connecting said first and second dielectric base means with metallic contact means oriented in perpendicular relation to said first and second dielectric base means and grounding said first and second dielectric base means.
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24. An electrical connector comprising:
25. (a) a plug member comprising a plug housing which at least partially encloses a conductive plug contact element and a plug dielectric element wherein said plug contact element extends axially inwardly from said plug dielectric element and said plug dielectric element extends radially outwardly in at least one direction from said plug contact element; and

- 4414

(b) a receptacle member comprising a receptacle housing which at least partially encloses a conductive receptacle contact and a plug dielectric element wherein said receptacle contact element extends axially inwardly from said receptacle dielectric element and said receptacle dielectric element extends radially outwardly in at least one direction from said receptacle contact element and said receptacle housing axially engages said plug housing and said receptacle contact element abuts said plug contact element.

5 25. The electrical connector of claim 24 wherein the conductive plug contact and the conductive receptacle contact extend generally perpendicularly from respectively the plug dielectric element and the receptacle dielectric element.

10 26. The electrical connector of claim 24 wherein means for grounding the plug dielectric element and the receptacle dielectric element are provided.

15 27. The electrical connector of claim 24 wherein the plug housing and the receptacle housing are metallic.

20 28. The electrical connector of claim 24 wherein the plug contact element and the receptacle contact element extend axially outwardly through respectively the plug dielectric element and the receptacle dielectric element to terminate respectively in at least one plug signal pins and in at least one receptacle signal pin.

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Abstract

Disclosed is an electrical connector in which the conductive and dielectric elements are arranged in a composite I beam shaped geometry in which the conductive element is perpendicularly interposed between two parallel dielectric and ground plane elements. Low cross talk and controlled impedance are found to result from the use of this geometry.

ClaimsWHAT IS CLAIMED IS:

1. An electrical connector, comprising:

a dielectric base;

a plurality of ground or power contacts in said dielectric base and comprising:

a mating portion for engaging a mating connector; and

a mounting portion for securing the connector to a substrate;

a plurality of signal contacts in said dielectric base, angled relative to said plurality of ground or power contacts and comprising:

a mating portion for engaging a mating connector; and

a mounting portion for securing the connector to a substrate; and

a plurality of solder masses, each secured to a respective one of said mounting ends of said plurality of ground or power contacts and said plurality of signal contacts for securing the connector to the substrate.

2. The electrical connector as recited in claim 1, wherein each of said plurality of signal contacts has opposed major surfaces defining sides and opposed minor surfaces defining edges, each of said edges positioned adjacent a respective one of said plurality of ground or power contacts.

3. The electrical connector as recited in claim 2, wherein said plurality of signal contacts extend transverse to said plurality of ground or power contacts.

5    4. The electrical connector as recited in claim 3, wherein said plurality of signal contacts extend generally perpendicular to said plurality of ground or power contacts.

10    5. The electrical connector as recited in claim 1, wherein each of said plurality of signal contacts has opposed major surfaces defining sides and opposed minor surfaces defining edges, wherein a coupling between said plurality of signal contacts and plurality of ground or power contacts is greater than a coupling between adjacent signal contacts for reducing cross-talk.

15    6. The electrical connector as recited in claim 1, wherein two of said plurality of ground or power contacts flank at least one of said plurality of signal contacts.

20    7. The electrical connector as recited in claim 6, wherein said plurality of signal contacts extend transverse to said plurality of ground or power contacts.

25    8. The electrical connector as recited in claim 7, wherein said plurality of signal contacts extend generally perpendicular to said plurality of ground or power contacts.

9. The electrical connector as recited in claim 6, wherein said plurality of ground or power contacts are parallel.

10. The electrical connector as recited in claim 1, wherein said plurality of signal contacts are arranged in an array of rows and columns.

11. The electrical connector as recited in claim 10, wherein said plurality of ground or power contacts extend between adjacent rows of signal contacts.

12. The electrical connector as recited in claim 11, wherein said plurality of ground or power contacts extend the entire length of respective rows of said signal contacts.

13. The electrical connector as recited in claim 1, wherein said dielectric base includes:

a plurality of apertures extending therethrough and corresponding to said plurality of ground or power contacts and said plurality of signal contacts;

a mounting surface positionable adjacent the substrate; and  
a plurality of recesses in said mounting surface in communication with said plurality of apertures, wherein said mounting portions of said plurality of signal contacts reside within a corresponding one of said plurality of recesses.

14. The electrical connector as recited in claim 1, wherein said dielectric base has a mating surface for engaging a mating surface of a

mating connector, said plurality of ground or power contacts and said signal contacts extending past said mating surface of said dielectric base.

15. The electrical connector as recited in claim 1, wherein said plurality of ground or power contacts and said signal contacts reside entirely within said dielectric housing.

16. The electrical connector as recited in claim 1, wherein said solder masses are solder balls.

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17. The electrical connector as recited in claim 1, wherein said solder masses are reflowable.

18. An electrical connector, comprising:

15     an insulative housing having a plurality of apertures extending therethrough;  
      a plurality of contacts, each in a respective one of said plurality of apertures and comprising:  
         a mating portion for engaging a contact on a mating connector; and  
20     a mounting portion for securing the connector to a substrate; and  
      a plurality of solder masses, each secured to a respective one of said mounting ends of said plurality of contacts.

25     19. The electrical connector as recited in claim 18, wherein said solder masses are solder balls.

20. The electrical connector as recited in claim 18, wherein said solder

masses are reflowable.

21. The electrical connector as recited in claim 18, wherein said plurality of contacts are arranged in an array of rows and columns.

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22. The electrical connector as recited in claim 18, wherein said insulative housing further comprises:

a mounting surface positionable adjacent the substrate; and

a plurality of recesses in said mounting surface in communication with said plurality of apertures, wherein said mounting portions of said plurality of contacts reside within a corresponding one of said plurality of recesses.

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23. The electrical connector as recited in claim 22, wherein said mounting portion of said plurality of contacts each include an angled portion residing within a corresponding one of said recesses and receiving said solder mass.

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24. The electrical connector as recited in claim 23, wherein said angled portion is generally parallel to the substrate.

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25. The electrical connector as recited in claim 22, wherein said plurality of recesses are rectangular.

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26. The electrical connector as recited in claim 18, wherein said dielectric base has a mating surface for engaging a mating surface of a mating connector, said plurality of contacts extending past said mating

surface of said dielectric base.

27. The electrical connector as recited in claim 18, wherein said plurality of contacts reside entirely within said dielectric housing.

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28. The electrical connector as recited in claim 18, wherein said insulative housing is generally planar.

29. The electrical connector as recited in claim 18, wherein said

10 insulative housing comprises:

a generally planar base having a periphery; and

a wall extending from said periphery of said base and adapted to engage side walls of a mating connector.

15 30. The electrical connector as recited in claim 18, wherein said mounting portion of said plurality of contacts each include an angled portion receiving a corresponding one of said solder masses.

20 31. The electrical connector as recited in claim 30, wherein said angled portion is generally perpendicular to said mating portion.

32. An electrical connector, comprising:

an insulative housing with a mating face positionable adjacent a mating connector and a mounting face positionable adjacent a substrate;

25 at least one contact extending between said mating face and said mounting face of said insulative housing and including a tail portion; and a solder mass secured to said tail portion for securing the electrical

**connector to the substrate.**

33. The electrical connector as recited in claim 32, wherein said solder mass is a solder ball.

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34. The electrical connector as recited in claim 32, wherein said solder mass is reflowable.

35. The electrical connector as recited in claim 32, wherein said tail portion includes an angled portion.

36. The electrical connector as recited in claim 35, wherein said angled portion extends generally parallel to the substrate.

15 37. The electrical connector as recited in claim 35, wherein said angled  
portion extends generally perpendicular from said contact.

38. The electrical connector as recited in claim 32, wherein said at least one contact comprises an array of contacts.

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39. The electrical connector as recited in claim 32, wherein said at least one contact extends from said insulative housing.

40. The electrical connector as recited in claim 32, wherein said at least one contact resides entirely within said insulative housing.